

3.5 – Midpoints and Bisectors

1) Use the picture on the right to answer the questions.

a. What is the angle bisector of $\angle TPR$?

$\overline{PS}$

b. P is the midpoint of what two segments?

$\overline{VS}$ and $\overline{QT}$

c. What is $m\angle QPR$?

90°

d. What is $m\angle TPS$?

45°

e. How does $\overline{VS}$ relate to $\overline{QT}$?

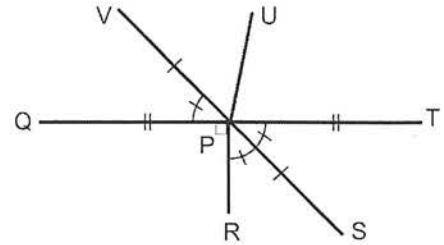
They bisect and intersect each other

f. Is $\overline{PU}$ a bisector? If so, of what?

Yes, $\overline{QT}$

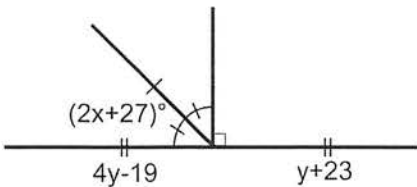
g. What is $m\angle QPV$?

45°



Solve the following for the variable. Show all algebraic work.

2)



$$2x + 27 = 45^\circ$$

$$2x = 18$$

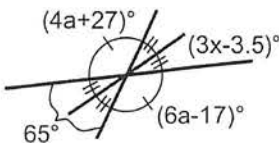
$$\boxed{x = 9^\circ}$$

$$4y - 19 = y + 23$$

$$3y = 42$$

$$\boxed{y = 14}$$

3)



$$4a + 27 = 6a - 17$$

$$44 = 2a$$

$$\boxed{22 = a}$$

$$3x - 3.5 = 32.5$$

$$3x = 36$$

$$\boxed{x = 12}$$

Find the midpoint between each pair of points. Show work.

4) $(-2, -3)$ and $(8, -7)$

$$\left(\frac{-2+8}{2}, \frac{-3+(-7)}{2} \right) = \boxed{(3, -5)}$$

5) $(9, -1)$ and $(-6, -11)$

$$\left(\frac{9+(-6)}{2}, \frac{-1+(-11)}{2} \right) = \boxed{(1.5, -6)}$$

6) $(-4, 10)$ and $(14, 0)$

$$\left(\frac{-4+14}{2}, \frac{10+0}{2} \right) = \boxed{(5, 5)}$$

7) $(0, -5)$ and $(-9, 9)$

$$\left(\frac{0+(-9)}{2}, \frac{-5+9}{2} \right) = \boxed{(-4.5, 2)}$$

Given the midpoint (M) and either endpoint of AB, find the other endpoint.

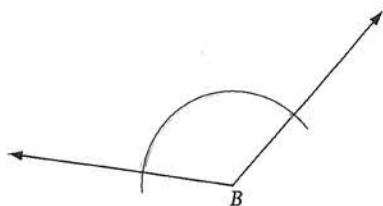
8) $A(-1, 2)$ and $M(3, 6)$

$$\begin{aligned} \frac{-1 + x_B}{2} &= 3 & x_B &= 7 \\ \frac{2 + y_B}{2} &= 6 & y_B &= 10 \end{aligned} \quad \boxed{(7, 10)}$$

9) $B(-10, -7)$ and $M(-2, 1)$

$$\begin{aligned} \frac{x_A + (-10)}{2} &= -2 & x_A &= 6 \\ \frac{y_A + (-7)}{2} &= 1 & y_A &= 9 \end{aligned} \quad \boxed{(6, 9)}$$

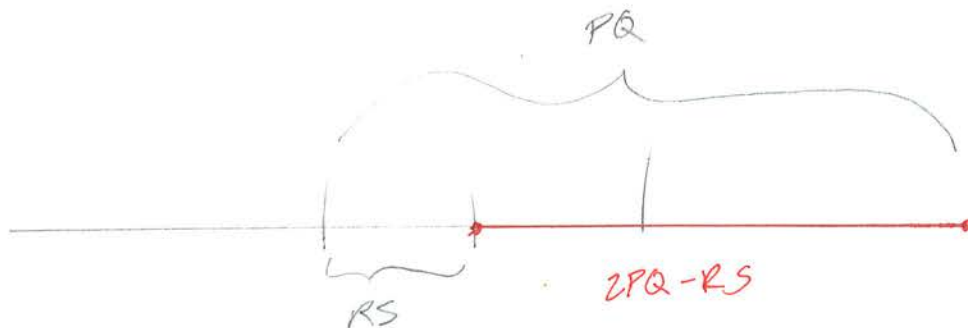
In exercises 10-11, use the segments and angles below.



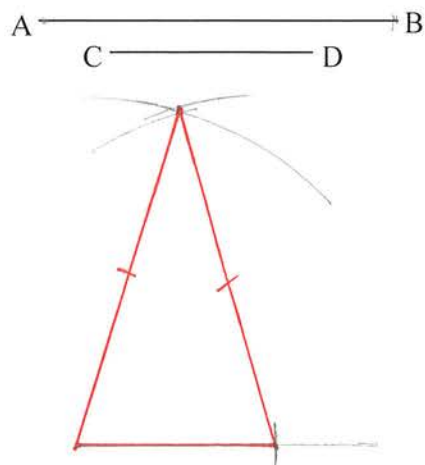
10) Duplicate $\angle B$



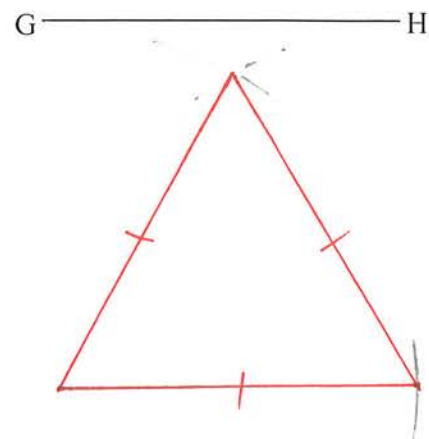
11) Construct a line segment with length $2PQ - RS$



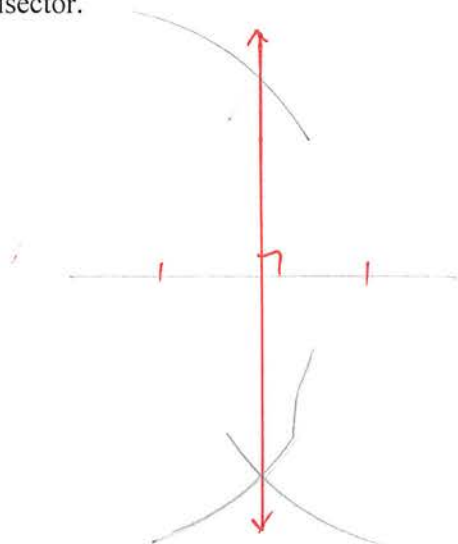
- 12) Construct an isosceles triangle with two sides congruent to $\overline{AB}$ and base congruent to $\overline{CD}$.



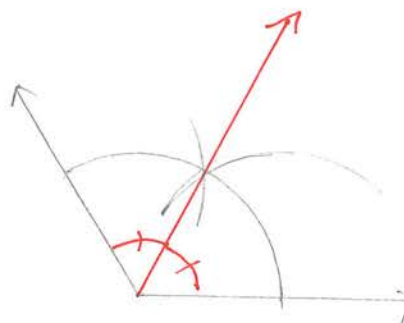
- 13) Construct an equilateral triangle with sides congruent to $\overline{GH}$.



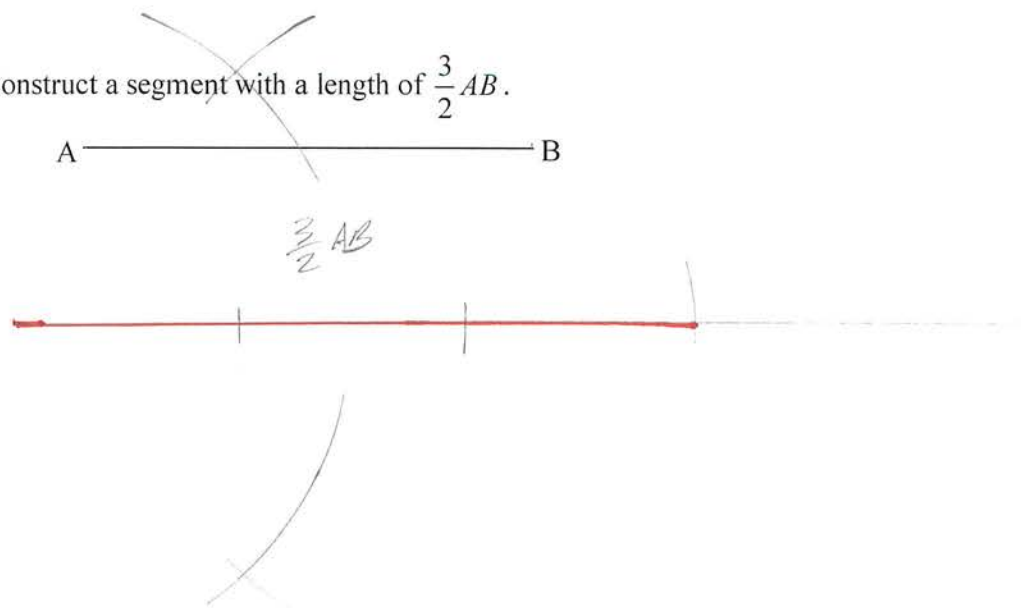
- 14) Draw a segment and construct its perpendicular bisector.



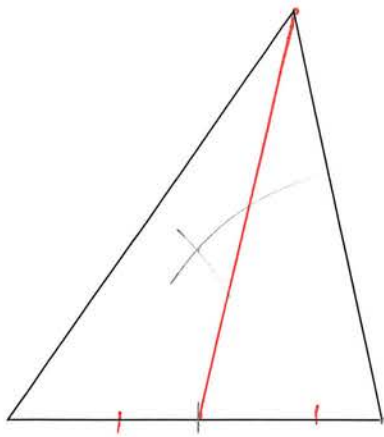
- 15) Draw an obtuse angle. Construct the angle bisector.



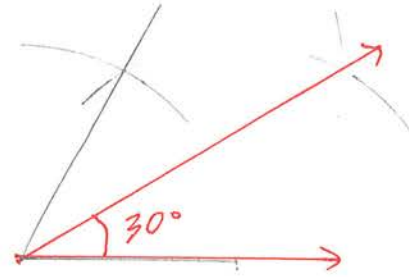
- 16) Construct a segment with a length of $\frac{3}{2}AB$.



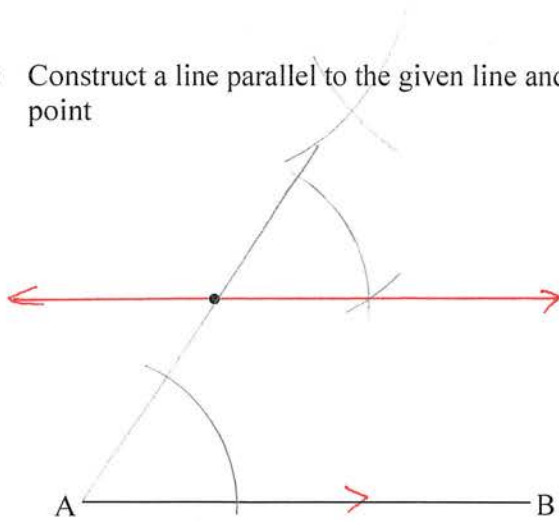
17) Construct a median for the following triangle:



18) Construct a 30° angle.



19) Construct a line parallel to the given line and point



20) Construct a line perpendicular to the given line and point

